

Real-Time Integrated Navigation System for Planetary Exploration (RT-INSPEX), Phase I

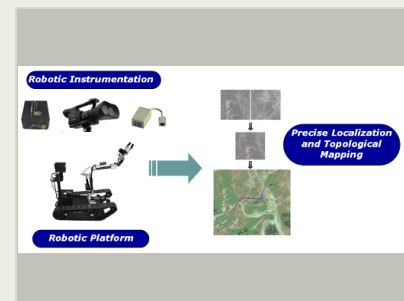
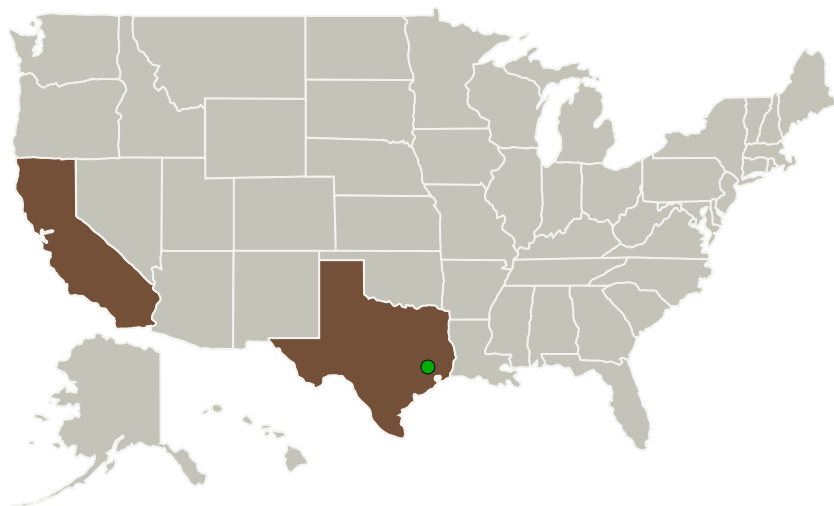
Completed Technology Project (2015 - 2015)



Project Introduction

For this topic, American GNC Corporation (AGNC) is proposing the "Real-Time Integrated Navigation System for Planetary Exploration" (RT-INSPEX) to off load work from robot operators and astronauts by providing semi to fully-autonomous navigation with infrastructure-free localization, terrain awareness and traversability estimation, and map generation of unknown environments. NASA is currently requiring improved mobile robotics navigation solutions for operation in both man-made and unstructured environments based on emerging state-of-the-art sensors and software. A common theme in planetary exploration missions is lacking access to the Global Navigation Satellite System (GNSS), making autonomous navigation of vehicles such as rovers significantly difficult. For addressing NASA's needs, the proposed technology will provide terrain-aware and infrastructure-free navigation with: (1) advanced vision processing; (2) robot localization without GNSS based on fusion of various odometry sources; (3) terrain traversability estimation, where measured terrain parameters are matched to terramechanics models for assessing trafficability; and (4) local map generation. Phase II work takes these technologies as a foundation for adaptive collision avoidance of semi/fully-autonomous robotics based on consistent global maps generation and optimal route planning navigation.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
American GNC Corporation	Lead Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Simi Valley, California
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations

California	Texas
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Project Transitions

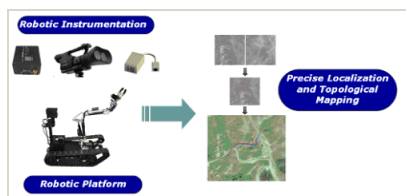
**June 2015:** Project Start**December 2015:** Closed out

Closeout Summary: Real-Time Integrated Navigation System for Planetary Exploration (RT-INSPEX), Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/139272>)

Images

**Briefing Chart Image**

Real-Time Integrated Navigation System for Planetary Exploration (RT-INSPEX), Phase I
(<https://techport.nasa.gov/image/128265>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

American GNC Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

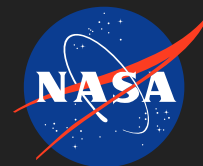
Tasso Politopoulos

Co-Investigator:

Tasso Politopoulos

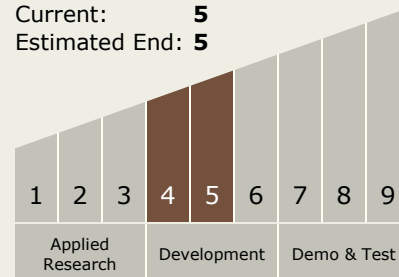
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Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.2 Mobility
 - └ TX04.2.4 Surface Mobility

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System